

WHAT IS CLAIMED IS:

1 1. An internal combustion engine with a plurality of cylinders,
2 the engine including an intake manifold and an exhaust manifold, the engine further
3 comprising:
4 a first exhaust path for receiving and routing exhaust gases;
5 a first NO_x adsorber located in the first exhaust path;
6 a second exhaust path for receiving and routing exhaust gases;
7 a flow control valve between the exhaust manifold and the first and
8 second exhaust paths for controlling the relative amounts of exhaust gas flowing
9 through the first and second exhaust paths; and
10 a first injector for injecting a reductant into the exhaust gas stream,
11 the first injector being located so as to inject the reductant at a location adjacent to
12 the flow control valve to cause mixing of the reductant and the exhaust gas and to
13 allow regeneration of the first NO_x adsorber.

1 2. The internal combustion engine of claim 1 wherein the first
2 injector is located so as to inject the reductant at a location immediately downstream
3 of the flow control valve along the first exhaust path.

1 3. The internal combustion engine of claim 1 further comprising:
2 a second NO_x adsorber located in the second exhaust path; and
3 a second injector for injecting a reductant into the exhaust gas stream,
4 the second injector being located so as to inject the reductant at a location adjacent
5 to the flow control valve to cause mixing of the reductant and the exhaust gas and
6 to allow regeneration of the second NO_x adsorber.

1 4. The internal combustion engine of claim 3 wherein the second
2 injector is located so as to inject the reductant at a location immediately downstream
3 of the flow control valve along the second exhaust path.

1 5. The internal combustion engine of claim 4 wherein the first
2 injector is located so as to inject the reductant at a location immediately downstream
3 of the flow control valve along the first exhaust path.

1 6. An internal combustion engine with a plurality of cylinders,
2 the engine including an intake manifold and an exhaust manifold, the engine further
3 comprising:
4 a first exhaust path for receiving and routing exhaust gases;
5 a first NO_x adsorber located in the first exhaust path;
6 a second exhaust path for receiving and routing exhaust gases;
7 a first flow control valve between the exhaust manifold and the first
8 exhaust path and a second flow control valve between the exhaust manifold and the
9 second exhaust path, the first and second flow control valves controlling the relative
10 amounts of exhaust gas flowing through the first and second exhaust paths; and
11 a first injector for injecting a reductant into the exhaust gas stream,
12 the first injector being located so as to inject the reductant at a location adjacent to
13 the first flow control valve to cause mixing of the reductant and the exhaust gas and
14 to allow regeneration of the first NO_x adsorber.

1 7. The internal combustion engine of claim 6 further comprising:
2 a second NO_x adsorber located in the second exhaust path; and
3 a second injector for injecting a reductant into the exhaust gas stream,
4 the second injector being located so as to inject the reductant at a location adjacent
5 to the second flow control valve to cause mixing of the reductant and the exhaust gas
6 and to allow regeneration of the second NO_x adsorber.

1 8. The internal combustion engine of claim 7 wherein the second
2 injector is located so as to inject the reductant at a location immediately upstream
3 of the second flow control valve along the second exhaust path.

1 9. The internal combustion engine of claim 6 wherein the first
2 injector is located so as to inject the reductant at a location immediately upstream
3 of the first flow control valve along the first exhaust path.

1 10. In an internal combustion engine with a plurality of cylinders,
2 the engine including an intake manifold and an exhaust manifold, the engine further
3 including, a first exhaust path for receiving and routing exhaust gases, a first NO_x
4 adsorber located in the first exhaust path, a second exhaust path for receiving and
5 routing exhaust gases, at least one flow control valve between the exhaust manifold
6 and the first and second exhaust paths for controlling the relative amounts of exhaust
7 gas flowing through the first and second exhaust paths, and a first injector for
8 injecting a reductant into the exhaust gas stream, the first injector being located so
9 as to inject the reductant at a location adjacent to a flow control valve to cause
10 mixing of the reductant and the exhaust gas and to allow regeneration of the first
11 NO_x adsorber, the method comprising:

12 operating the engine in an active mode wherein exhaust gas flows
13 through the first exhaust path and through the first NO_x adsorber such that the first
14 NO_x adsorber adsorbs NO_x from the exhaust gas; and

15 subsequently, operating the engine in a regenerative mode wherein
16 a reduced amount of the exhaust gas flows through the first exhaust path and
17 through the first NO_x adsorber and wherein the reductant is injected into the reduced
18 amount of the exhaust gas at a location adjacent to a flow control valve to cause
19 mixing of the reductant and the exhaust gas such that the first NO_x adsorber
20 catalytically reduces the previously adsorbed NO_x to regenerate the first NO_x
21 adsorber.

1 11. In an internal combustion engine with a plurality of cylinders,
2 the engine including an intake manifold and an exhaust manifold, the engine further
3 including, a first exhaust path for receiving and routing exhaust gases, a first NO_x
4 adsorber located in the first exhaust path, a second exhaust path for receiving and
5 routing exhaust gases, a second NO_x adsorber located in the second exhaust path,
6 at least one flow control valve between the exhaust manifold and the first and second
7 exhaust paths for controlling the relative amounts of exhaust gas flowing through the
8 first and second exhaust paths, a first injector for injecting a reductant into the
9 exhaust gas stream, and a second injector for injecting a reductant into the exhaust
10 gas stream, the first injector being located so as to inject the reductant at a location

11 adjacent to a flow control valve to cause mixing of the reductant and the exhaust gas
12 and to allow regeneration of the first NO_x adsorber, the second injector being
13 located so as to inject the reductant at a location adjacent to a flow control valve to
14 cause mixing of the reductant and the exhaust gas and to allow regeneration of the
15 second NO_x adsorber, the method comprising:

16 operating the engine in an active mode wherein exhaust gas flows
17 through the first exhaust path and through the first NO_x adsorber such that the first
18 NO_x adsorber adsorbs NO_x from the exhaust gas and exhaust gas flows through the
19 second exhaust path and through the second NO_x adsorber such that the second NO_x
20 adsorber adsorbs NO_x from the exhaust gas;

21 subsequently, operating the engine in a first regenerative mode
22 wherein a reduced amount of the exhaust gas flows through the first exhaust path
23 and through the first NO_x adsorber and wherein the reductant is injected into the
24 reduced amount of the exhaust gas at a location adjacent to a flow control valve to
25 cause mixing of the reductant and the exhaust gas such that the first NO_x adsorber
26 catalytically reduces the previously adsorbed NO_x to regenerate the first NO_x
27 adsorber; and

28 subsequently, operating the engine in a second regenerative mode
29 wherein a reduced amount of the exhaust gas flows through the second exhaust path
30 and through the second NO_x adsorber and wherein the reductant is injected into the
31 reduced amount of the exhaust gas at a location adjacent to a flow control valve to
32 cause mixing of the reductant and the exhaust gas such that the second NO_x adsorber
33 catalytically reduces the previously adsorbed NO_x to regenerate the second NO_x
34 adsorber.

1 12. The method of claim 11 further comprising:

2 when the engine is operated in the first regenerative mode and the
3 reduced amount of the exhaust gas flows through the first exhaust path to regenerate
4 the first adsorber, routing a remainder of the exhaust gas through the second exhaust
5 path such that the second adsorber remains active.

- 1 13. The method of claim 11 further comprising:
- 2 when the engine is operated in the second regenerative mode and the
- 3 reduced amount of the exhaust gas flows through the second exhaust path to
- 4 regenerate the second adsorber, routing a remainder of the exhaust gas through the
- 5 first exhaust path such that the first adsorber remains active.